THE OHIO SPECIES OF THE GENUS DISONYCHA.*

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The genus Disonycha is a small group of beetles belonging to the family Chrysomelidae. They are generally distributed throughout the United States but are abundant only in certain sections, where they may become of some considerable economic importance. Certain species are distinctly southern in distribution, others are found more commonly in the arid portions of the country, while still other species may be found only in sections that are under cultivation. The species seem to possess, to quite a marked degree, the ability to adapt themselves to widely varying environmental conditions and this fact may be responsible for their very general distribution throughout the country. The food plants of the group as a whole are mostly herbaceous although some species may be found feeding on shrubs or even on forest trees. Several species are frequently reported as doing a very considerable amount of injury to the leaves of sugar beets and spinach, the latter becoming so badly eaten as to be unsalable. Lambs-quarter and spiny pigweed are also favorite food plants, but since these plants are not of economic importance, the injury done to them is beneficial rather than injurious. Two species reported from New York were found quite generally on the common arrow-head, Sagitarria variabilis and also on beets, spinach, Chenapodium album and Amarantus spinosus.

Some peculiar habits of the group are worth mentioning. In the first place in several of the species upon which observations have been made, the adults and larvae feign death and fall to the ground when suddenly disturbed, although if the approach is made quietly, the adults will either not move or will take wing and fly to another plant. On account of this habit, the cause of the injury to beet-leaves and the like is frequently not observed and may be attributed to other insects. D. quinquevittata has been observed (Ref's. 3, 7) swarming near Yuma, Arizona. About three o'clock in the afternoon an immense swarm, probably 20 or 25 feet thick, was observed passing up the Colorado River, following quite closely the bed of the stream and flying about 50 ft. above the water. When insects migrate, it is usually on account of a lack of food, but since there was an abundance of food present in this instance the migration may have been caused by the peculiarly sultry condition of the atmosphere at this time; this is frequently a cause of migration in other groups of insects. Reports of migrations of this species are not known from any other section of the country.

Although the group has been known for a long time and more or less work of a general nature has been done upon the various

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species, in only one or two instances has anything like a definite life history been worked out and then not very completely. Reports of their occurrence, the extent of injury and occasionally a description of egg, larva or pupa, with a few recommendations for treatment make up the bulk of the limited amount of literature available. Mr. F. H. Chittenden[1] of the Bureau of Entomology has worked out the life history of Disonycha xanthomelaena at Washington, D. C. Miss M. E. Murtfeldt[5] reported the same species as doing considerable damage to spinach beds in Missouri in 1899. Mr. L. Bruner[6] has reported D. quinquevittata and D. pensylvanica as injurious to young trees in Nebraska, early in the spring when the buds begin to open. Mr. H. Garman[7] has reported D. glabrata from Lexington, Ky. where the larvae strip the leaves from pigweed, Amarantus retroflexus.

D. triangularis and D. xanthomelaena also do a considerable amount of injury to beet leaves in Illinois, although the natural host plant is the lambs-quarter. Brief mention of some of the other species has been made at various times, a list of which literature is found in the appended bibliography.

Of the 18 species in the genus, 11 are found in Ohio, the list of which is as follows:

1.	Disonycha	pensylvanica.	7.	Disonycha	abbreviata.
2.	"	discoidea.	8.	"	triangularis.
3.	"	quinquevittata.	9.	"	xanthomelaena.
4.	"	crenicollis.			(collaris.)
5.	"	caroliniana.	10.	"	mellicollis.
6.	"	glabrata.	11.	"	collata.

A complete key and quite elaborate descriptions of all the 18 species of the genus has been worked out by Mr. Geo. H. Horn, M. D., and included in his paper on "A Synopsis of the Halticini of Boreal America" and since no key for the distinctly Ohio species is in print, the following key, adapted in great part from Horn, is presented with brief descriptions and notes on the distribution of the several Ohio species.

Key to the Ohio Species of Disonycha.

After Geo. H. Horn, M. D.

1. Form elongate, parallel, elytra subsulcate, thorax rather irregularly convex; elytra yellow, with black vittae.....**pensylvanica.**
   Varieties:
   - Thorax with spots confluent in a large discal black space, having a comparatively narrow yellow border. Body beneath and legs black ..... **limbicollis.**
   - Head in part yellow. Thorax beneath entirely yellow. Body beneath black, abdomen paler at sides and apex...**pensylvanica**
   - Head in part yellow. Thorax beneath entirely yellow. Body beneath black. Abdomen paler at sides and apex. Legs are reddish yellow, tibia darker, tarsi piceous.....**pallipes.**
   - Black of the surface replaced by a rufous; legs even to tarsi, reddish yellow ..... **conjugata.**

   Form more or less oval, elytra even; thorax regularly convex.....2

2. Elytra vittate....3
   Elytra with large discal spot black....**discoidea.**
   Elytra dark violet, olive or green....8
3. Elytra with a submarginal vitta....4
   Elytra without submarginal vitta....7
4. Abdomen densely punctured, subopaque, the pubescence conspicuous....5
   Abdomen very sparsely punctured and shining.
   Pubescence scarcely visible....6
5. Head coarsely punctured from side to side; occiput piceous or brown. **quinquevittata.**
   Head smooth at middle.
   Elytral vittae rather broad, head and metasternum more or less fuscous or piceous, labrum piceous....**crenicollis.**
   Elytral vittae narrow, head and body beneath always pale yellow, labrum pale....**caroliniana.**
6. Thorax smooth; head rough; epipleurae black....**glabrata.**
7. Median elytral vitta broad; antennae normal; thorax not spotted... **abbreviata.**
8. Body beneath and legs entirely black; thorax with three spots in a triangle; elytra punctate....**triangularis.**
9. Posterior femora entirely or in part piceous..
   Abdomen alone entirely yellow; hind femora bicolored or entirely black; head piceous; elytra blue-black....**xanthomelaena.**
   Posterior femora entirely yellow; abdomen piceous, apex and sides yellow; head bicolored. Elyrta blue or violet; form of body oval, as in xanthomelaena....**mellicollis.**
   Elytra bright green, form more oblong....**collata.**

D. pensylvanica. Illig. Oblong, nearly parallel. Head black, front yellow, surface nearly smooth except a small group of punctures near each eye. Scuttelum black. Body beneath entirely black, side margin of elytra and outer side of epiplurae yellow, the inner margin usually piceous. Abdomen finely pubescent; legs variable in color from black to rufous.

This species occurs all over the United States and Canada, but is more especially the species of the northern region, that is to say, it extends east and west, north of the fortieth parallel of latitude. In Ohio this species has been taken at Sandusky, Columbus, and Cincinnati and probably occurs elsewhere in the state.

D. discoidea. Fab. Oval, slightly depressed. Head yellow, surface smooth, a small fovea at the upper inner border of the eye. Scutellum yellow. Body beneath, entirely yellow. Abdomen punctate, pubescence distinct, but not conspicuous. Legs yellow, the outer side of the tibia and the tarsi black. Length .22–.30 inch; 5.5–7.5 mm.

This species varies but little and occurs generally from North Carolina to Texas. The species has been taken from Hanging Rock and Cincinnati in southern Ohio.

D. quinquevittata. Say. Oblong oval. Head yellow and except in rare instances with the occiput piceous; coarse and deep punctures extending from side to side of vertex. Thorax with 5 black spots, often only two present. Scutellum black. Epiplurae pale; body beneath reddish yellow. Abdomen densely punctured, pubescence close and conspicuous. Legs reddish yellow, tibia at tip darker, tarsi piceous. Length 5.5–9. mm.

This species is especially that of the entire region west of the Mississippi River, extending from our northern boundary to

Mexico and from the Mississippi to the Pacific. It occurs sparingly farther east. The species is quite numerous at Sandusky, Ohio, and has also been taken at Georgesville and Cincinnati.

D. crenicollis. Say. Oval, slightly narrower in front. Head either entirely yellow or with occiput piceous. Scutellum black. Prothorax beneath yellow. Metasternum black, abdomen yellowish or pale brown, densely punctured and with a conspicuous silken pubescence. Femora reddish yellow, piceous along the upper edge, tibia and tarsi piceous. Length 5.5–6.5 mm.

This species occurs from New York to southwestern Texas and Mexico and has been taken in Ohio at Cincinnati.

D. caroliniana. Fab. Oval, slightly narrower in front. Head entirely yellow, entirely smooth except a punctured fovea at the upper inner border of the eye. Thorax with two piceous spots of variable size behind the apical border. Scutellum black. Body beneath reddish yellow. Epiplurae entirely piceous, sometimes entirely yellow. Abdomen closely punctate, pubescence distinct. Legs reddish yellow, tibia at tip and tarsi piceous. Length 5.–6.5 mm.

This species occurs from Pennsylvania to Florida and has been taken at Columbus, Ohio.

D. glabrata. Fab. Oblong oval, surface very shiny, as if varnished. Head variable in color, often entirely black or entirely yellow. Thorax yellow with a narrow median spot, often indistinct. Scutellum black. Body beneath yellow, posterior portion of metasternum rarely piceous. Abdomen finely alutaceous, sparsely punctate. Legs yellow, tips of tibia and tarsi piceous. Length 5.–5.5 mm.

Occurs from Georgia to Arizona and has been reported from Columbus and Cincinnati, Ohio.

D. abbreviata. Mels. Oval, slightly oblong. Head yellow, surface smooth, a rounded punctured fovea at the upper and inner border of the eye. Scutellum yellow. Body beneath and epiplurae yellow. Abdomen sparsely punctate, shining, pubescence short. Legs yellow, the outer side of the tibia and tarsi black. Length 6.–8.5 mm.

Occurs from the Middle States to Florida and Texas, extending into Mexico. Also reported from Columbus and Cincinnati, O.

D. triangularis. Say. Form oval, rather depressed, feebly shining. Entirely black, thorax reddish yellow with three black spots arranged in a triangle. Head entirely black. Prothorax beneath yellow. Abdomen coarsely punctate, pubescence short and indistinct. Legs entirely black. Length 5.–6.5 mm.

Occurs in the entire region east of the Rocky Mountains, including Canada. Reported in Ohio from Columbus and Cincinnati.

D. xanthomelaena. Dalm. Oval, slightly depressed, feebly shining, thorax yellow, elytra dark blue. Head black with a few coarse and deep punctures, irregularly placed. Prothorax beneath yellow, metasternum black. Abdomen entirely yellow, densely punctate with distinct pubescence. Femora yellow at basal half, (sometimes entirely black) the apical piceous, also the tibia and tarsi. Length 5.5 mm.

Occurs from the New England States to Kansas, Texas and Florida. Reported in Ohio from Columbus and Cincinnati.

D. mellicollis. Say. Oval, similar in form to xanthomelaena. Head blue-black between the eyes and posteriorly, front yellow, a few deep coarse punctures near each eye. Thorax pale yellow. Prothorax yellow beneath, metathorax piceous, abdomen piceous at the middle with apical segment and wide border yellowish. Femora entirely yellow; tibia piceous; paler at the base; tarsi piceous. Length 4.5–5. mm.

Occurs in Louisiana, Texas and Colorado. Also reported from Cincinnati, Ohio.

D. collata. Fab. Oval, slightly oblong, sub-depressed. Vertex and occiput black, front yellow, a few coarse punctures close to the eyes. Thorax yellow, immaculate. Prothorax beneath yellow, metasternum black. Abdomen piceous with the last segment and sides broadly yellowish, densely punctured with a distinct pubescence. Femora pale yellow, tibia at tips and tarsi piceous. Length 4.–4.5 mm.

Occurs in Georgia and Florida. Reported from Cincinnati, O.

Life History Studies.

While at the Ohio State University Lake Laboratory at Sandusky the past summer, opportunity was afforded to do some work on the life history of D. quinquevittata, the life cycle of which species, as far as I am aware has never been studied.

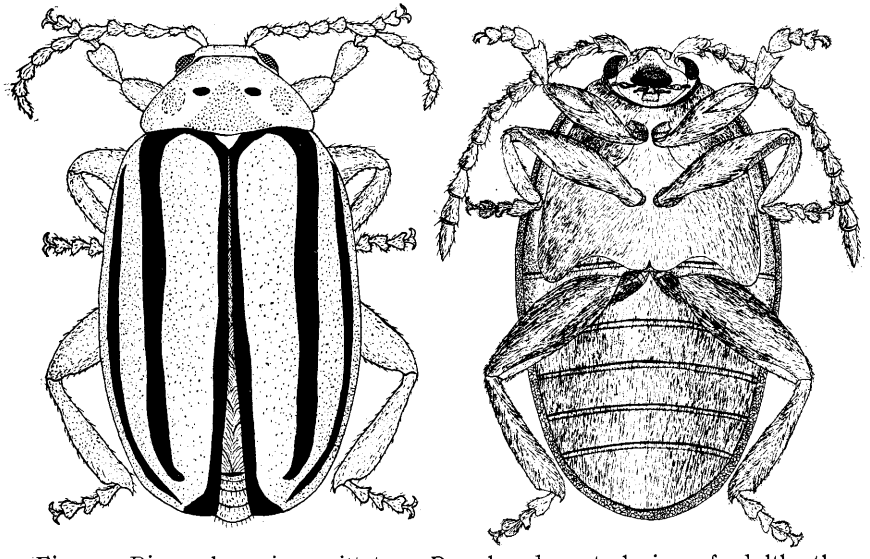

Fig. 1. Disonycha quinquevittata. Dorsal and ventral view of adultbeetle.

The beetles and larvae in this region feed upon a small scrub willow, Salix interior, which grows in rather isolated and well defined patches on the sand plain on the lake side of Cedar Point, and when I arrived at the Laboratory about the 25th of June, the beetles were quite abundant, and some larvae were found although not as many as later on.

About the middle of July the larvae became very numerous and the adult beetles decreased very appreciably in number. By the first of August the larvae had practically all disappeared and the adults were quite numerous again, and as further observations until the first of September failed to show another brood of larvae, it is probable that the species is single-brooded in this locality, and that the beetles hibernate through the winter and with the warming of the ground in spring they appear and lay the eggs for the production of the generation of larvae which was beginning to appear when I arrived.

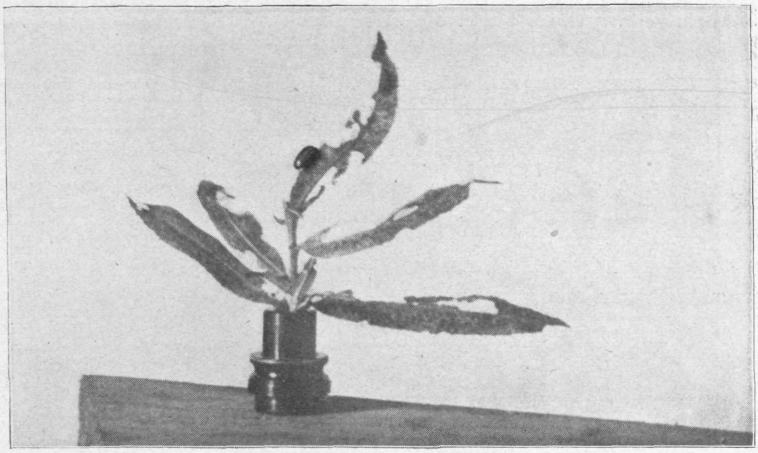

Fig. 2. Beetle on Salix interior showing extent of injury.

The adult beetles are oblong, oval and vary from 8—10 mm. in length and from 4—6 mm. in width. The eggs are elliptical, of a bright yellow color and have a finely reticulated surface; they average .59 mm. in diameter and 1.74 mm. in length and are deposited rather promiscuously on the sand under the host plant, according to observations made in the insectary. This method of egg deposition would seem to agree fairly well with that of Disonycha xanthomelaena, yet whether or not this method would prevail in nature cannot be said with certainty.

The eggs require from six to seven days to hatch, the young larvae escaping by a longitudinal slit near the end of the egg as in xanthomelaena. The larvae are voracious feeders and grow rapidly during this entire stage which lasts from twenty-eight to thirty days.

A Coleopterous pupa case was found buried about three inches in the sand under one of the willows and although the pupa was

dead, it was probably that of D. quinquevittata. It was an elliptical, capsule-like body, about ¼-inch long with the outside covered with fine grains of sand. The pupa stage probably lasts from six to nine days as in xanthomelaena.

Thus the development may be said to require from forty to forty-five days. The reason for the adults and larvae overlapping so much during the early part of the season may be attributed to the difference in the time of the appearance of the adults in the spring. The whole life cycle is probably an adaptation to the peculiar conditions of this locality and may very likely differ much from the normal cycle under ordinary conditions.

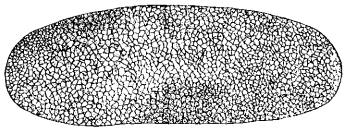

Fig. 3. Egg of Disonycha quinquevittata.

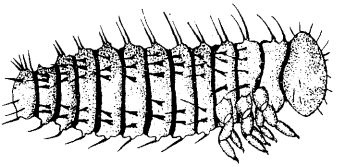

Fig. 4. Newly hatched larva of Disonycha quinquevittata.

Another species, Disonycha pensylvanica, variety pallipes also occurs in this region, although not as abundant as the preceding form. The beetles are somewhat smaller than D. quinquevittata, not so oval and have sub-sulcate elytra and a parallel form. The black elytral vittae are also much wider, giving the insect a much darker general appearance.

The eggs are laid in small bunches on the surfaces of semi-erect leaves of Polygonum emersum. The young larvae at once begin feeding upon these leaves, which soon become perforated with small holes and turn brown.

When the larvae are full grown they crawl off this plant to neighboring stalks of the Burr Reed—Sparganium eurycarpum. Each larva bores into the thick lower part of a leaf or stalk of this plant and forming a little cell for itself, lies head uppermost and here pupates. The pupae are bright orange or salmon color. Each stalk of the second host plant may contain a dozen or more pupae lying end to end in separate cells.

The length of the various stages of this species were not determined, but it is probable that the life cycle occupies somewhere near the same period as D. quinquevittata, since both occur so close together.

The writer wishes to express his sincere thanks to those who have, in various ways, contributed to the success of this work. Among these, should be mentioned first, Professor Herbert Osborn, under whom the work was conducted and whose valuable suggestions have aided in no small way the character of

the results obtained. Professor J. S. Hine gave the use of his private collection and also offered many valuable suggestions. Miss M. M. Haskins, of Toledo, Ohio, continued the observations at the Lake Laboratory for some time after August 1st when the writer left. Thanks are also due Mr. R. J. Sim for the observations made upon Disonycha pensylvanica pallipes, which he kindly furnished, and which are included in the present treatise.

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